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Claims searched: 1

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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.T): H2E [ECSB, ECSD]

Int CI (Ed.7): H01R, H05K

Other: On-line: WPI, JAPIO, EPODOC

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2344471 A [CHANNEL]	1, 2

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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(58) Field of Search

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(54) Abstract Title

Electrical connector for CATV tap

(57) An electrical connector for transmitting radio frequency electrical signals comprises a first f connector 11, a second f connector 12, a conductor 13 extending between the first and second f connectors and a rigid jacket 14 extending between the first and second f connectors and providing a waterproof seal encapsulating the conductor. The jacket may be moulded to the connector and conductor assembly while the connector and conductor are restrained in position by a jig.

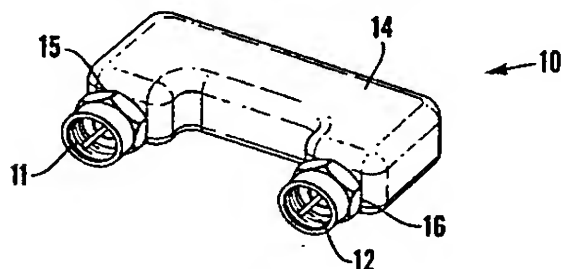


Fig. 1a

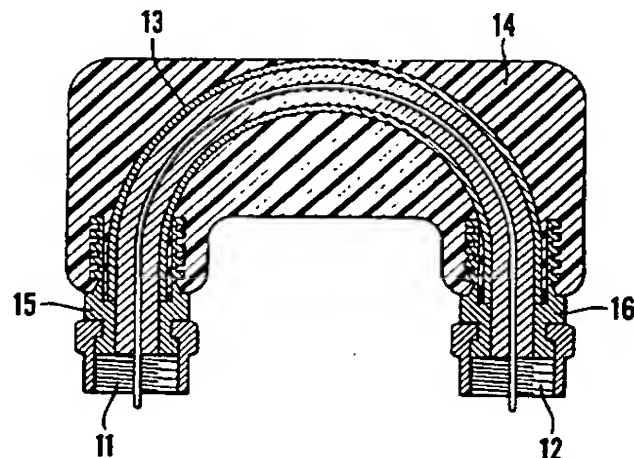


Fig. 2

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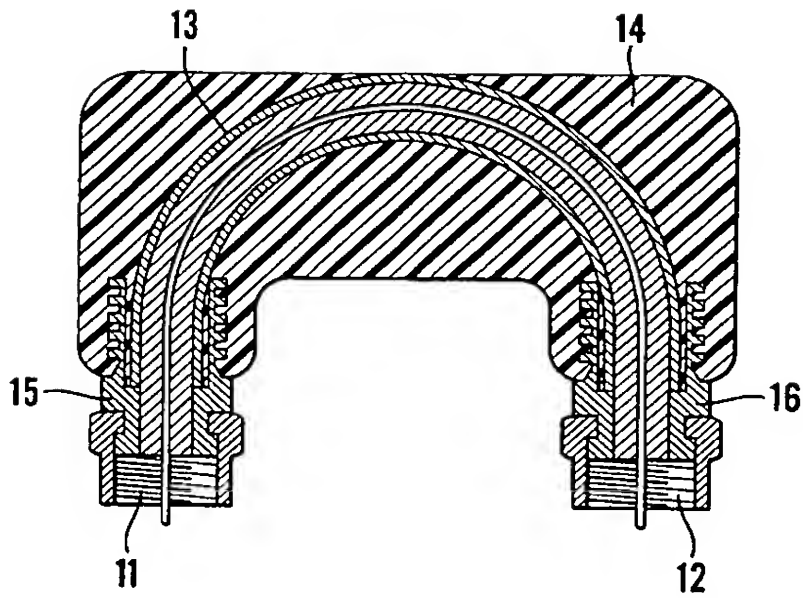


Fig.2

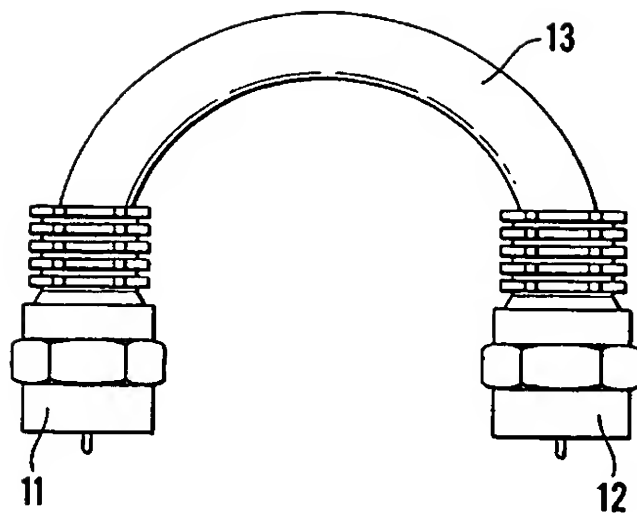


Fig.3

The through path ports can be connected by conventional co-axial cable. However, during installation co-axial cable is prone to damage as it is flexed back and forth by the engineer while making connections to the other ports and in the course of general handling. Again this can lead to the ingress of moisture and degradation of the rf signal. Further, there is no control over the curvature of the co- axial cable which also affects the quality of the rf signal. Furthermore, it is not possible to have a consistent connection quality between each of the taps of the cascade which can also affect the rf signal quality. The electrical and mechanical consistency of tap port connections is essential when taps are used in digital, telephony and data services.

Hence there is a need for a through port connector which allows for a modular assembly of multi-port taps while obviating the problems inherent in the use of conventional co-axial cabling.

According to a first aspect of the present invention there is provided an electrical connector for transmitting radio frequency electrical signals, comprising a first f- connector, a second f-connector, a conductor extending between the first and second f-connectors and a rigid jacket extending between the first and second f-connectors and encapsulating the conductor.

Thus, the rigid jacket is able to provide an additional waterproof seal if necessary.

The industry standard rf applications terminal connector is known as an f-connector. The invention provides a connector having a pair of f-connectors with an electrical conductor extending between them and an outer coating, or jacket, which encapsulates the conductor so as to render the entire connector a hermetically sealed and rigidified unit. As the connector is rigid, it is not prone to damage by bending or impacts while manhandled during assembly. The material

degrade the radio frequency performance of the conductor. The selected curvature is maintained constant by the rigid encapsulating jacket thus ensuring a consistent rf performance.

Preferably the first f-connector and second f-connector are attached to the rigid jacket by high compression joints. High compression joints between the jacket and f-connectors help to hermetically seal the connector, prevent the ingress of moisture and also protect against rf leakage.

The first f-connector may be male. The first and second f- connectors may be male. The f-connectors may be any combination of male and female f-connectors as required by the specific application of the connector.

Preferably the conductor is co-axial cable. The conductor may be shielded co-axial cable. More preferably the conductor is a single piece of tri-shield RG59 coaxial cable.

According to a second aspect of the invention there is provided a cascade of pedestal mount taps having at least one radio frequency through path provided by an electrical connector comprising a first f-connector, a second f- connector, a conductor extending between the first and second f-connectors and a rigid jacket extending between the first and second f-connectors and encapsulating the conductor.

According to a third aspect of the invention there is provided a method of manufacturing an electrical connector comprising a first f-connector, a second f-connector, a conductor extending between the first and second f-connectors and a rigid jacket extending between the first and second f-connectors and providing a waterproof seal encapsulating the conductor, the method comprising the steps of:

With reference to Figures 1a, b and c there are shown perspective, side and end views of an electrical connector, designated generally by reference numeral 10, according to the present invention. Figure 2 shows a cross section of such an electrical connector through line AA' of Figure 1c. The connector comprises a first f-type connector 11 and a second f-type connector 12. The f-connectors are RG59 crimp connectors. F-type connectors are industry standard in radio frequency (rf) applications. The first and second f connectors are high compression male f connectors.

A conductor in the form of co-axial cable 13 extends between the first and second f connectors. In particular, the co-axial cable is a single piece of tri-shield RG59 co-axial cable. The RG59 co-axial cable is attached to the first and second RG59 crimp connectors. The distance between the central conductor of the co-axial cable 13 is 40mm. The bend radius of the co-axial cable is selected so as to ensure good rf performance of the co-axial cable.

The conductor has a rigid jacket 14 in the form of a moulded plastics jacket made of a Macromelt moulding compound which encapsulates the conductor and is attached to the f- connectors by high compression joints 15, 16. The jacket provides a general rigidity and robustness to the connector such that it has a U shape. Macromelt compound OM 638 has a shore A-hardness of 90, a tensile strength at rupture of 5.2Nmm^{-3} , dielectric constant (at 1kHz) of 4.7 and volume resistivity of $2.4 \times 10^{13} \Omega\text{cm}$. It has a glass transition temperature of -36°C , a softening point of 175°C and a viscosity at 210°C of 3700mPas.

Alternatively, the jacket could be moulded of any suitable plastics material and fitted around the conductor and f-connectors, or the conductor and f-connectors could be inserted into the mould prior to charging and the plastics jacket formed thereabout.

An electrical connector 46 according to the invention is connected across the power through output port of the first tap 42 and the power through input port of the second tap 42 so that rf power is provided to the second tap in the cascade. Similarly a second electrical connector 47 according to the invention is provided to provide through rf power from the second tap 42 to the third tap 43.

The connection of further cabling to the ports of the taps has previously tended to cause damage to the through power inter-connector, resulting in inconsistent rf performance, when in the form of a flexible co-axial cable or can damage the port terminals. But the rigidity of the electrical connector of the current invention minimises damage and helps to prevent moisture degradation of the rf signals. If a one piece cascade assembly is used then a single damaged port on one tap means that the whole assembly needs replacing resulting in substantial wasted installation time, equipment and loss of service to the customer. However, using the connector of the current invention a modular installation method may be used and only the damaged tap need be replaced rather than the entire cascade. The U shape of the connector eases installation of a cascade for the technician as the power through ports of the taps can easily be mated with the f-connectors which are presented directly to them.

9. An electrical connector for transmitting radio frequency electrical signals, comprising a first f connector, a second f connector, a conductor extending between the first and second f connectors and a rigid jacket extending between the first and second f connectors and providing a waterproof seal and encapsulating the conductor.
10. A series of pedestal mount taps having at least one radio frequency through path provided by an electrical connector as claimed in any preceding claim.
11. A method of manufacturing an electrical connector comprising a first f-connector, a second f- connector, a conductor extending between the first and second f-connectors and a rigid jacket extending between the first and second f-connectors and providing a waterproof seal encapsulating the conductor, the method comprising the steps of:
 - assembling the first and second f-connectors and conductor in a jig to maintain the conductor in a preferred configuration;
 - providing a mould about the f-connectors and conductor and introducing a sealing compound into the mould;
 - allowing the sealing compound to cure; and
 - removing the mould and the sealed conductor and f-connectors from the jig once the sealing compound has cured sufficiently to provide a rigidified jacket to maintain the preferred configuration of the conductor.
12. A method of manufacturing an electrical connector comprising a first f-connector, a second f- connector, a conductor extending between the first and second f-connectors and a rigid jacket extending between the first and second f-connectors and providing a waterproof seal encapsulating the conductor, the method comprising the steps of:
 - assembling the first and second f-connectors and conductor in a jig to maintain the conductor in a preferred configuration;